

Claims

[c1] 1. A method for configuring detailed manufacturing knowledge for fabricating an object, the method comprising:
extracting design criteria from one or more design data files;
parsing design criteria into elemental manufacturing building modules independent of the one or more design data files and storing to a database a meta-data file comprising the extracted design criteria and the elemental manufacturing building modules;
incorporating into the meta-data file manufacturing criteria not contained in the one or more design data files; and
accessing the database and extracting manufacturing knowledge, if any, for optimizing the manufacturing process of the object to be fabricated and incorporating the manufacturing knowledge into the meta-data file, wherein the meta-data file is independent of the one or more design data files from which the design criteria was extracted and wherein the meta-data file is capable of directing the manufacturing of the object to be fabricated.

[c2] 2. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 1, wherein the design data file is generated via at least one of a Composite design system, CAPP, CAE, CAD, and CAM program

[c3] 3. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 1, wherein the meta-data file is capable of being released concurrently with the design data file.

[c4] 4. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 2, wherein the manufacturing knowledge included in the meta-data file is at least one of manufacturing requirements, material preparation criteria, production support and cost.

[c5] 5. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 1, wherein the manufacturing knowledge included in the meta-data file is at least one of manufacturing requirements, material preparation criteria, production support and cost.

[c6] 6. The method for configuring detailed manufacturing knowledge for fabricating

an object according to Claim 1, wherein attributes of the meta-data file are capable of being stored, searched and retrieved for optimal design and engineering practices from the database.

- [c6] 7. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 5, wherein a meta-data file is capable of being stored and retrieved from a library in the database based on one or more of the objects attributes.
- [c7] 8. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 1, wherein the meta-data file is further comprised of detailed process planning and information for engineered parts that is independent of and integrates design criteria of at least one of a CAD program, CAM program, Process Data Management program, process planning system, and Manufacturing Execution System software package.
- [c8] 9. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 1, further including the steps of analyzing the design criteria of the meta-data file and correcting manufacturing problems, difficulties, and design issues encountered using a knowledge base of manufacturing rules and detailed part information and manufacturing strategy.
- [c9] 10. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 1, wherein meta-data files contained in the database identified as being universal for large part families are combined with specific part features and geometric attributes contained in the meta-data file to produce a part specific manufacturing definition.
- [c10] 11. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 1, further including the step of generating cost estimates for producing an engineered object using a manufacturing process defined in the meta-data file.
- [c11] 12. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 11, wherein cost estimation is based in part on the strategy used to produce a part.

- [c12] 13. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 1, further including the step of integrating into the meta-data file knowledge obtained via a WAN, LAN, Internet or global communication network hosted producibility session to enable and support design analysis and collaboration by all involved parties.
- [c13] 14. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 1, further including the step of capturing electronically manufacturing information generated during a producibility session in the database for future use in similar situations.
- [c14] 15. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 1, further including the step of tailoring the meta-data file to a particular manufacturer's production standards through a supplier database.
- [c15] 16. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 15, further including the step of analyzing the meta-data file and the supplier database to determine if a particular supplier is capable of manufacturing an engineered object and to determine most capable suppliers for an engineered object.
- [c16] 17. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 16, further including the step of sorting supplier manufacturing capabilities and production issues by at least one of geographic region, company size, sales volume, product yield, lead-time, and common manufacturing and business measures.
- [c17] 18. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 1, further including the step of defining major manufacturing steps contained in the meta-data file capable of being used by a scheduling system to build and track a web-enabled supplier exception process.
- [c18] 19. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 1, wherein the meta-data file further

includes analytical definitions of a machined production part and manufacturing strategy in terms of features and feature elements

20. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 19, wherein the features include at least one of pocket, slab, hole, profile, surface, recess, and cut-out.

[c19] 21. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 20, wherein the features elements include at least one of extruded volume, swept volume, offset volume, void volume, and cylinder volume.

[c20] 22. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 1, wherein the meta-data file comprises one of an XML format structure and a HTML format structure.

[c21] 23. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 22, wherein the meta-data file format is capable of being accessed via one of a WAN, LAN, Internet and a global communications network.

[c22] 24. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 1, wherein the meta-data file is capable of being edited with respect to individual alterations to design criteria without having to reproduce the entire meta-data file.

[c23] 25. A system for configuring detailed manufacturing knowledge for fabricating an object according, the system comprising:
means for extracting design criteria from one or more design data files;
means for parsing design criteria into elemental manufacturing building modules independent of the one or more design data files and storing to a database a meta-data file comprising the extracted design criteria and the elemental manufacturing building modules;
means for incorporating into the meta-data file manufacturing criteria not contained in the one or more design data files; and
means for accessing the database and extracting manufacturing knowledge, if

any, for optimizing the manufacturing process of the object to be fabricated and incorporating the manufacturing knowledge into the meta-data file, wherein the meta-data file is independent of the one or more design data files from which the design criteria was extracted and the meta-data file is capable directing the manufacturing of the object to be fabricated.

[c24] 26. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 25, wherein the meta-data file is capable of being released concurrently with the data file.

[c25] 27. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 26, wherein the manufacturing knowledge included in the meta-data file is at least one of manufacturing requirements, material preparation criteria, production support and cost.

[c26] 28. The method for configuring detailed manufacturing knowledge for fabricating an object according to Claim 27, wherein the manufacturing knowledge included in the meta-data file is at least one of manufacturing requirements, material preparation criteria, production support and cost.

[c27] 29. A data structure for configuring manufacturing knowledge and expertise in designing and fabricating an object for manufacture, the data structure comprising:
a part level strategy section, the part level strategy section defines general part level attributes and requirements for manufacturing an object;
a numerical control setup section, wherein the numerical control setup section defines object fabrication activities for the object set up on a numerical control machine;
a quality assurance section, wherein the quality assurance section defines numerical control machine setup;
a post operation section, wherein the post operation section defines non-machine tooling functions for manufacturing the object; and
a manual operation section, wherein the manual operation section defines attributes of non-Numerical Control machine driven operations.

[c28] 30. The data structure for configuring manufacturing knowledge according to Claim 29, wherein the data structure further including at least one of:
a cutting tool assembly definition section, wherein the cutting tool assembly definition section defines parameters and settings for a tool used in manufacturing the object;
a numerical control action section, wherein the numerical control action section defines numerical control material removal operations; and
a quality assurance action section, wherein the quality control action section defines manual inspection activities for a numerical control machine setup.

[c29] 31. A software product for configuring detailed manufacturing knowledge for fabricating an object, the software product residing on a computer readable medium capable of instructing a general purpose computer to perform:
an instruction for extracting a design criteria from one or more design data files;
an instruction for parsing design criteria into elemental manufacturing building modules independent of the one or more design data files and storing to a database a meta-data file comprising the extracted design criteria and the elemental manufacturing building modules;
an instruction for incorporating into the meta-data file manufacturing criteria not contained in the one or more design data files; and
an instruction for accessing the database and extracting manufacturing knowledge, if any, for optimizing the manufacturing process of the object to be fabricated and incorporating the manufacturing knowledge into the meta-data file, wherein the meta-data file is independent of the one or more design data files from which the design criteria was extracted and wherein the meta-data file is capable directing the manufacturing of the object to be fabricated.

[c30] 32. A system for configuring detailed manufacturing knowledge for fabricating an object, the system comprising:
a data processor including memory, capable of inputting and outputting data and instructions to peripheral devices;
a database in communication with the data processor for storing, accessing and retrieving data;

a graphical user interface capable of interfacing with and navigating a software product for configuring detailed manufacturing knowledge, wherein the software product is capable of directing the data processor, the software product comprises:

an instruction for extracting a design criteria from one or more design data files;

an instruction for parsing design criteria into elemental manufacturing building modules independent of the one or more design data files and storing to a database a meta-data file comprising the extracted design criteria and the elemental manufacturing building modules;

an instruction for incorporating into the meta-data file manufacturing criteria not contained in the one or more design data files; and

an instruction for accessing the database and extracting manufacturing knowledge, if any, for optimizing the manufacturing process of the object to be fabricated and incorporating the manufacturing knowledge into the meta-data file, wherein the meta-data file is independent of the one or more design data files from which the design criteria was extracted and wherein the meta-data file is capable directing the manufacturing of the object to be fabricated.

[c31]

33. A system for configuring detailed manufacturing knowledge for fabricating an object, the system comprising:

a data processor including memory capable of inputting and outputting data and instructions to peripheral devices;

a database in communication with the data processor for storing, accessing and retrieving data;

a graphical user interface capable of interfacing with and navigating a software product for configuring detailed manufacturing knowledge, wherein the software product is capable of instructing the data processor to perform instructions pursuant to the software product, the software product comprises:

an instruction for extracting a design criteria from design data files;

an instruction for parsing design criteria into manufacturing building blocks independent of the design data files and storing to a database the manufacturing building blocks;

an instruction for incorporating into the design criteria manufacturing criteria not contained in the design data files; and

an instruction for accessing the database and extracting manufacturing knowledge, if any, for optimizing the manufacturing process of the object to be fabricated and incorporating the manufacturing knowledge into the manufacturing process; and

directing the manufacturing of the object to be fabricated.

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